

Pulse Field Gel Electrophoresis

The DHEC Public Health Laboratory performs a variety of tests to characterize foodborne illnesses. The Molecular Epidemiology Laboratory performs Pulse Field Gel Electrophoresis to establish similarities between isolates of bacteria within the same groups. The South Carolina List of Reportable Conditions designates which foodborne isolates from clinical, food, and environmental specimens are required to be submitted to and tested by the Public Health Laboratory. This list includes organisms such as *Salmonella*, *Shigella*, and positive Shiga toxin producing *Escherichia coli*.

Pulse Field Gel Electrophoresis uses “molecular scissors” to cut the genomic DNA at specific sequences creating DNA fragments. These DNA fragments are then used to migrate

through a gel matrix by size creating a DNA fingerprint for the isolates being tested. These fingerprint patterns are put into groups of organisms and serotypes and are compared with other isolates within a specified time period that have common factors of location, age, sex, and race.

The compilation of this information is used to detect foodborne illness clusters that are investigated by DHEC’s Division of Acute Disease and Epidemiology to determine if a foodborne outbreak has occurred. If an outbreak is identified, an investigation is initiated to stop the foodborne illness and to provide education on how to prevent future occurrences. Please assist us in detecting foodborne outbreaks by ensuring that the patient’s county of residence, birthday, sex and race are filled out for each isolate submitted.

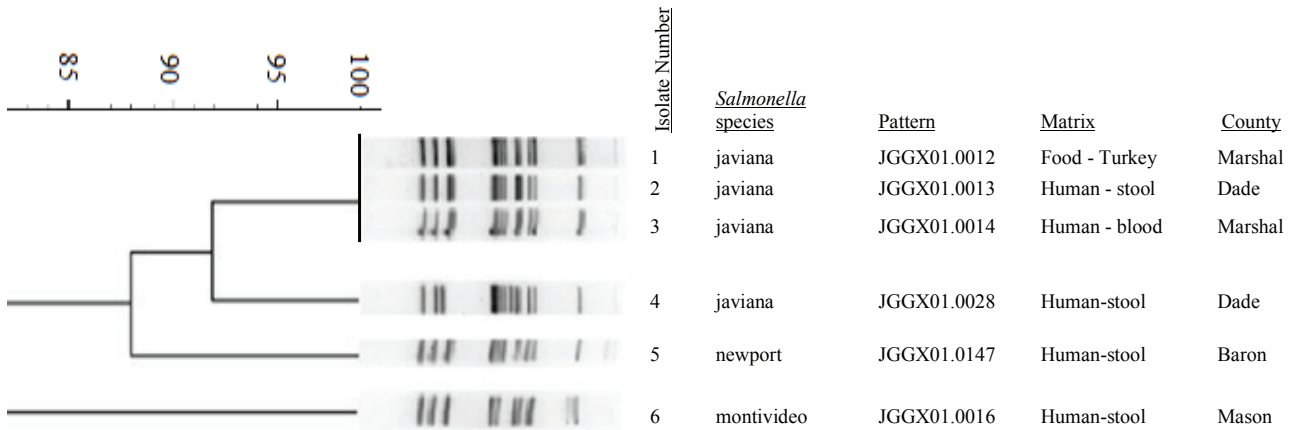


Illustration prepared by Amanda Moore

In the above illustration, the fingerprint patterns of isolate numbers 1, 2, and 3 are “indistinguishable” from each other, indicating a cluster. The remaining 3 isolates have different serotypes (isolates 5 and 6) or a different pattern (Isolate 4) and are not flagged for an Epidemiologist investigation. Results of the javiana pattern JGGX01.0012 investigation have determined that the patient associated with Isolate 3 ate at restaurant X on 10-29-2017 and the patient from Isolate 2 visited his daughter in Marshal County and took her to lunch at restaurant X on 10-30-2017. Isolate 1 was obtained from leftover turkey at restaurant X in Marshal County.



Spotlight on Influenza

The SC PHL Virology Laboratory is part of a larger network of state public health laboratories that partners with CDC and WHO to monitor circulating strains of Influenza virus year round for public health preparedness. The Influenza Surveillance program has several goals:

- Determining when and where Influenza activity is occurring in the state
- Determining what Influenza viruses are circulating
- Detecting changes in Influenza viruses
- Identification of novel strains of Influenza
- Identifying anti-viral resistance in circulating Influenza strains

In order to assist CDC and WHO with these goals, samples need to be submitted to the Public Health Laboratory (PHL) in order for identification to be performed using the CDC Influenza assay. A portion of the Influenza isolates received at the PHL are sent to the CDC for antigenic characterization and antiviral sensitivity testing. This helps to strengthen the national Influenza surveillance effort.

This year the PHL will offer Influenza surveillance testing by the CDC RT-PCR assay. All Influenza-positive samples will be further sub-typed to the A and B lineages. If negative for Influenza, RT-PCR for other respiratory pathogens will be performed. No prior approval for testing is necessary.

For surveillance purposes, the PHL requests that you collect a nasopharyngeal (NP) swab or throat swab for testing. This swab must be shipped on cold packs in viral transport media and received within 72 hours of collection. Any specimens received more than 72 hours post-collection will have a disclaimer attached to the result. A nasopharyngeal swab continues to be the specimen of choice for Influenza testing.

Other important points for the 2017-2018 surveillance season:

1. Please collect and submit no more than 5 specimens per week for surveillance. The turnaround time for Influenza testing is two to four business days. Patients that have tested positive or negative on rapid Influenza detection tests are acceptable. Please indicate on the requisition form if a rapid detection has been performed.
2. Please submit all PCR-positive Influenza A/unsubtypable specimens.
3. All specimens should be shipped to the attention of the Virology Laboratory.
4. If the patient has been on anti-viral treatment or had the Influenza vaccine, please indicate this on the test request form.
5. There is no lab-test charge for submitting specimens for Influenza surveillance.
6. **If you have reason to suspect avian Influenza (H5N1 or H7N9), please contact the Division of Acute Disease Epidemiology's on-call Medical Consultant at 803-898-0861 during business hours and 1-888-847-0902 on nights and weekends.**

If you have any questions about the Influenza Surveillance program or need supplies, please call Christy Greenwood, Virology Laboratory Supervisor, at 803-896-0819.

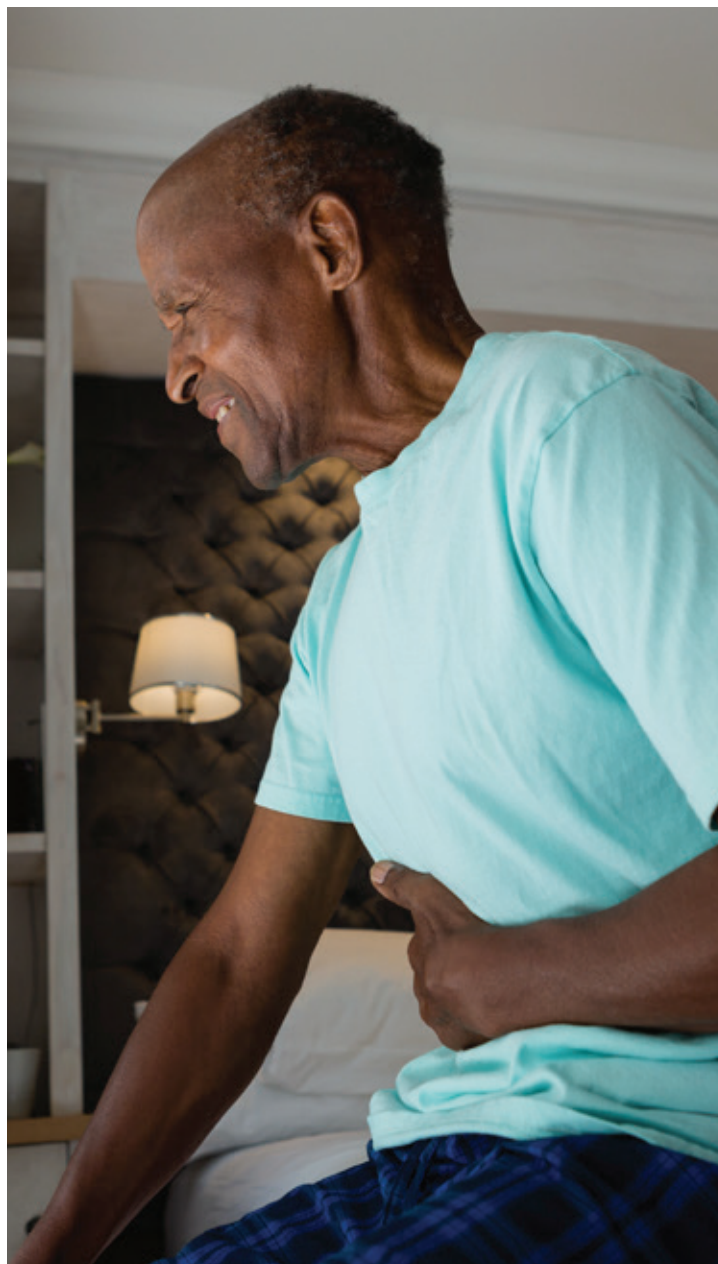
B. cereus* biovar *anthracis

Bacillus cereus (*B. cereus*) is a common foodborne pathogen and laboratory contaminant. In food matrices, the organism can cause gastric illness of diarrhea, abdominal cramping, and vomiting that can last up to 24 hours. Outside of the gastrointestinal tract, *B. cereus* is considered an opportunistic pathogen that can cause local and systemic infections. Variant isolates of *B. cereus*, now classified as *Bacillus cereus* biovar *anthracis*, have been identified in parts of Africa. The organism produces clinical presentations similar to anthrax.

On April 12, 2017, *B. cereus* biovar *anthracis* was included in the Health and Human Services List of Select Agents and Toxins categorized as a Tier One Non-overlap select agent. Federal regulation guidelines regarding biosafety, biosecurity, reporting and shipping of Tier One agents are outlined on the Federal Select Agent website in [42. C.F.R. Part 73: Public Health](#).¹

The addition of *B. cereus* biovar *anthracis* as a select agent led to the revision of the American Society of Microbiology *Bacillus anthracis* Sentinel Level Clinical Laboratory Guideline in September of 2017, to include identification information on *Bacillus cereus* biovar *anthracis*. The revisions included are an expansion of isolate information, as well as an update to identification flowchart, and can be found on the [ASM website](#).² These ASM guidelines should be reviewed by all sentinel laboratories for *B. cereus* biovar *anthracis* characterization.

The current guideline recommendation for motile and non-motile suspect *Bacillus cereus* biovar *anthracis* isolates is to notify the Special Pathogens Laboratory and to obtain the patient's symptomology and travel history to determine what tests to proceed with. Please be prepared to share the patient's name, date of birth, and the physician's name and phone number with the Special Pathogens Laboratory. The Special Pathogens Laboratory can be contacted at 803-896-0777 or 803-767-8118.



Links to references:

- 1 https://www.ecfr.gov/cgi-bin/text-idx?tpl=/ecfrbrowse/Title42/42cfr73_main_02.tpl
- 2 <https://www.asm.org/images/PSAB/LRN/Anthrax%20LRN%20091217>